1.1.3

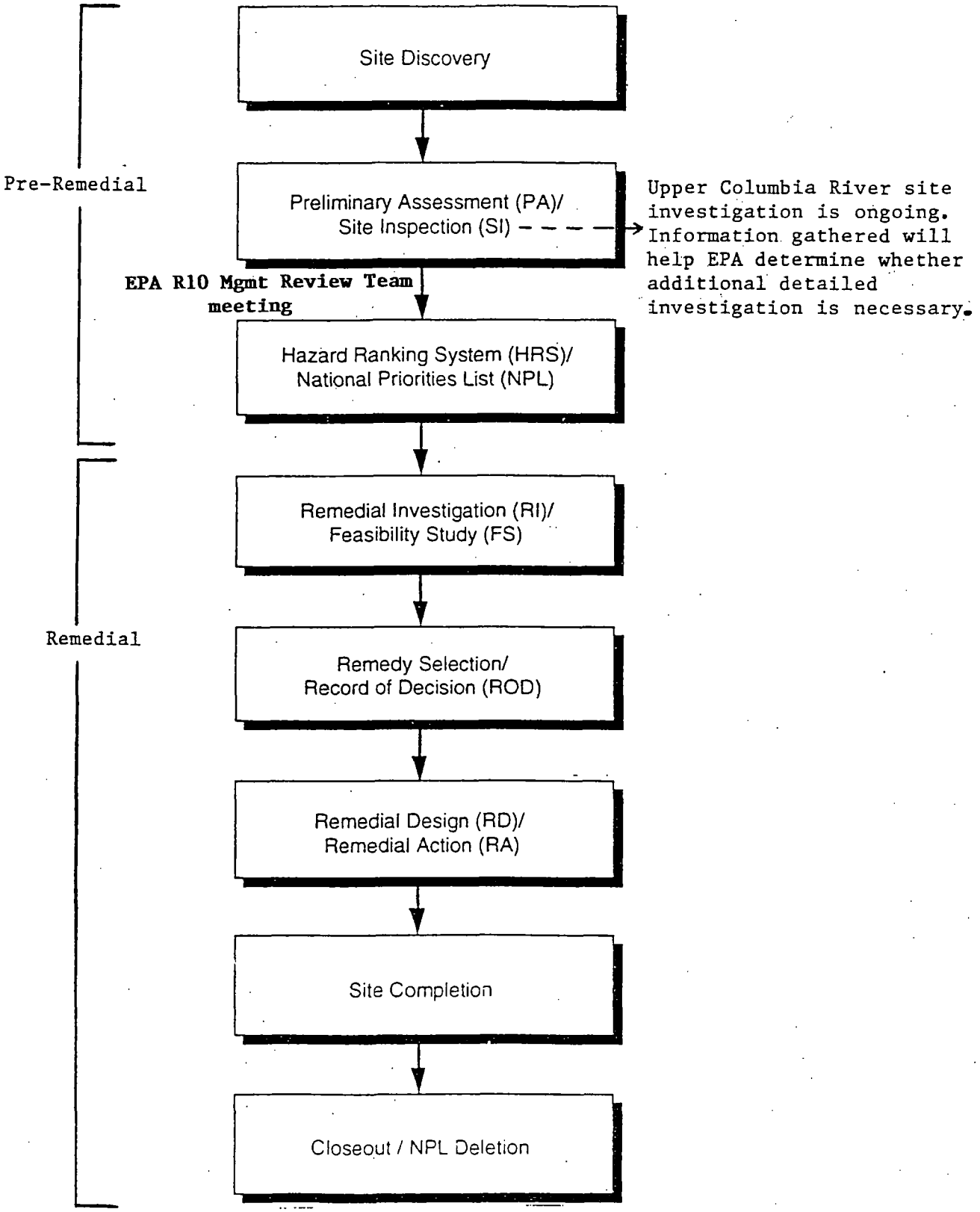
EPA - Ecology meeting
Upper Columbia River site
Ecology Headquarters Office-Olympia, WA
Mt. Adams meeting room
August 21, 2002
12:30 - 2:30 p.m.

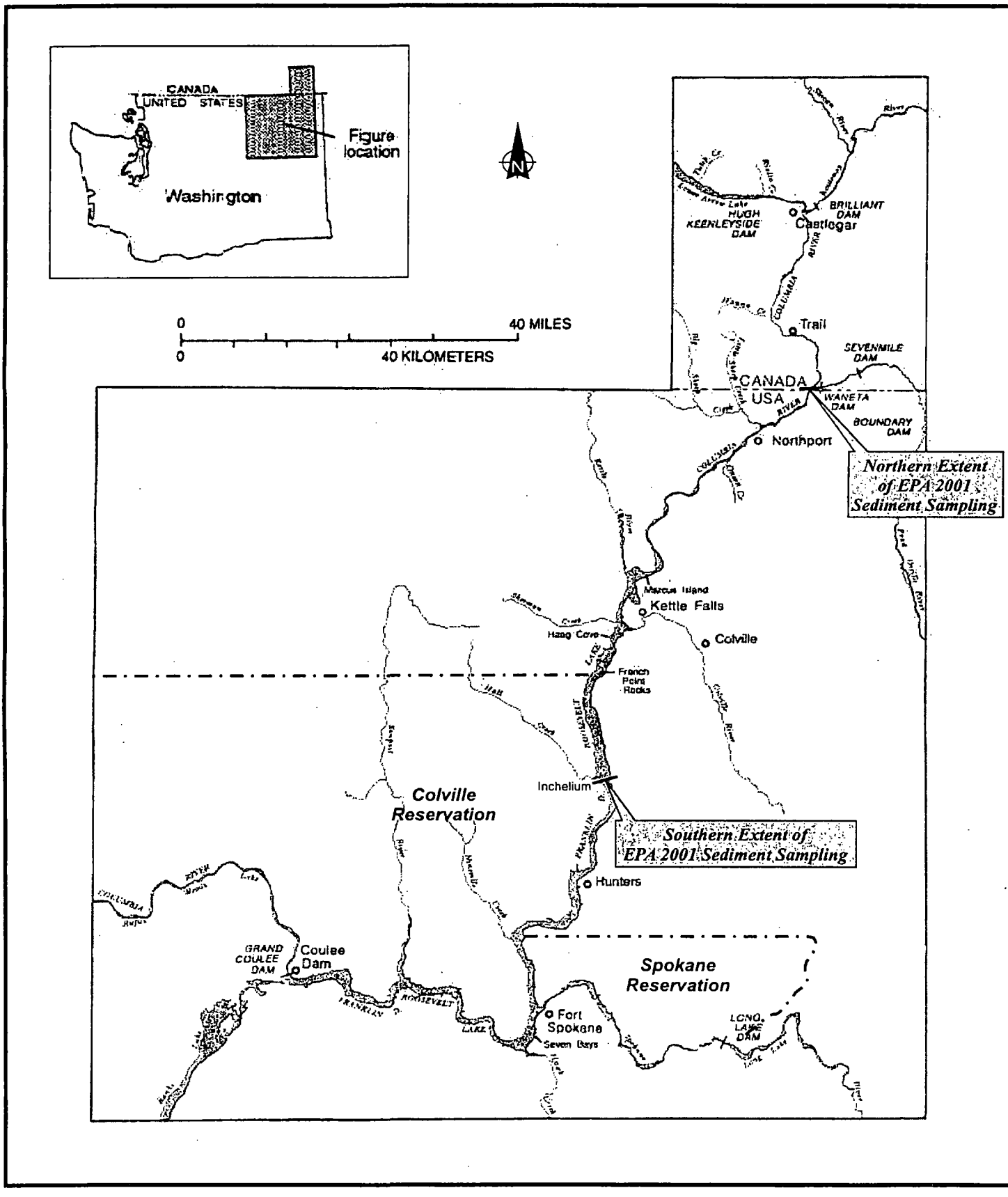
Agenda

Introductions	
Background Information and Update on CERCLA Upper Columbia River Site Investigation	EPA (20 min.)
Next steps in Superfund site assessment process	EPA (10 min.)
Site Management Options	EPA & Ecology (1 hr.)

Other topics
- future meetings
- reports

The Superfund Process





UPPER COLUMBIA RIVER
VICINITY MAP

MINES AND MILLS
LOWER PEND OREILLE RIVER MINES AND MILLS PRELIMINARY ASSESSMENTS AND SITE INSPECTIONS
PEND OREILLE COUNTY, WASHINGTON

	Mine/Mill Name	Mine/Mill	LAT			LONG			S	T	R	River System(s)
	Sterling	Mine	48	50	10.32	117	23	29.04	32	39N	43E	Overland (1,700 ft), Pend Oreille River at River Mile 29.
	Metaline	Mine	48	50	32.64	117	23	24.00	32	39N	43E	Overland (1,700 ft), Pend Oreille River at River Mile 29.
*	Blue Bucket	Mine	48	50	37.68	117	23	53.52	32	39N	43E	Overland (1,700 ft), Pend Oreille River at River Mile 29.
	Bella May	Mine	48	50	53.16	117	24	16.20	29	39N	43E	Unnamed Creek, through Metaline, Pend Oreille River at River Mile 29.
	Diamond R.	Mine	48	51	12.60	117	25	19.20	30	39N	43E	Unnamed Creek, through Metaline, Pend Oreille River at River Mile 29.
	Lehigh No. 1	Mine	48	51	02.52	117	24	14.04	29	39N	43E	Unnamed Creek, through Metaline, Pend Oreille River at River Mile 29.
	West Contact	Mine	48	51	07.92	117	24	56.88	30	39N	43E	Linton Creek, Pend Oreille River at River Mile 29.25.
	Lehigh No. 2	Mine	48	51	31.68	117	24	52.20	30	39N	43E	Linton Creek, Pend Oreille River at River Mile 29.25.
*	Oriole	Mine	48	51	36.72	117	24	46.44	19	39N	43E	Linton Creek, Pend Oreille River at River Mile 29.25.
*	Josephine	Mine	48	52	48.00	117	22	15.96	16	39N	43E	Overland, Pend Oreille River (9 miles south fo Boundary Dam).
*	Grandview	Mine/Mill	48	52	22.04	117	21	26.16	14,15,22,30	39N	43E	Overland, Pend Oreille River (9 miles south fo Boundary Dam).
*	Pend Oreille	Mine/Mill	48	52	54.12	117	21	36.00	10,11,14,15	39N	43E	Overland, Pend Oreille River (9 miles south fo Boundary Dam).
	Yellowhead	Mine	48	52	59.88	117	22	14.16	16	39N	43E	Overland (1,000 ft), Pend Oreille River (8 miles south of Boundary Dam).
	Hoage	Mine	48	56	57.48	117	21	18.00	22	40N	43E	Upper Lead King Lake, Lower Lead King Lake, Everett Creek
	Lucky Strike	Mine	48	55	49.80	117	19	51.24	35	40N	43E	Overland (800 ft), Pend Oreille River (4 miles south of Boundary Dam).
	Lead King	Mine	48	56	16.44	117	21	13.32	27	40N	43E	Lower Lead King Lake, Everett Creek
	Z Canyon	Mine							11	40N	43E	Overland (1,400 ft), Pend Oreille River (2,500 ft north of Boundary Dam).
	Lead Queen	Mine							11	40N	43E	Overland (1 mile), Pend Oreille River (1,000 ft north of Boundary Dam).
	Lead Hill	Mine	48	58	12.72	117	11	49.56	11, 12, 13, 14, 22, 23, 27	40N	44E	Slate Creek , Pend Oreille River (5 miles south of Boundary Dam).
	King Tut	Mine							2,11	40N	44E	Overland, Unnamed Tributary, Canada
	Red Top	Mine							1,2	40N	44E	Overland, Lead Creek, Canada

Key:

E	= East.
ft	= feet.
Lat	= Latitude.
Long	= Longitude.
N	= North.
R	= Range.
S	= Section.
T	= Township.

*** sampling conducted by EPA in 2001**

MINES AND MILLS

UPPER COLUMBIA RIVER EXPANDED SITE INSPECTION
STEVENS COUNTY, WASHINGTON

	Mine/Mill Name	LAT			LONG			S	T	R
*	Sierra Zinc/Blue Ridge Mine/Mill	48	46	28.20	117	40	06 24	19, 20, 29, 30	38N	41E
	Magma Mine	48	46	00.48	117	38	25 08	28	38N	41E
	Farmer Mine	48	50	5928	117	37	17.40	34	39N	41E
	Maki Mine	48	50	45.60	117	36	00.00	35	39N	41E
*	Electric Point Mine/Mill	48	52	56.28	117	32	29.04	17, 18, 19, 20	39N	42E
*	Gladstone Mine/Mill	48	53	12.48	117	32	35.16	17, 18, 19	39N	42E
	Lucky Four Mine	48	52	51.6	117	32	33.00	17	39N	42E
*	Red Top Mine	48	56	35.88	117	33	52.20	25	40N	41E
*	Anderson/Calhoun Mine/Mill	48	55	09.84	117	35	28.68	2	39N	41E
	Lucile Mine	48	57	01.08	117	3	12.24	30	40N	42E
*	Iroquois Mine	48	57	06.12	117	32	22.92	20, 29, 30	40N	42E
	Silver Queen Mine									
*	Melrose Mine	48	56	44.52	117	38	45.96	28	40N	41E
	Lakeview Mine	48	57	51.84	117	32	57.12	19	40N	41E
	Jackson Mine	48	57	35.64	117	34	08.04	24	40N	41E
	Frisco Standard Mine	48	59	34 80	117	26	39.48	12	40N	42E
	Myeerah Mine	48	59	26.16	117	27	14.76	11	40N	42E
	United Treasure Mine	48	59	21 48	117	27	51.12	11	40N	42E
*	Daisy Mine	48	22	45.8	118	4	42 6	6	33N	38E
*	L-Bar/Northwest Magnesite	48	15	21.94	117	43	6.25	23	32N	40E
*	Northwest Alloys	48	21	26	117	50	54	11, 12, 13, 14	33N	39E
*	Napoleon Mine/Mill	48	44	12.1	118	6	4.32	3	37N	37E
	First Thought Mine	48	53	2 04	118	9	32	7, 18	39N	37E
	Lottie Mine	48	51	53.28	118	01	15.24	19	39N	38E
	Homestake No. 1 Mine	48	52	06.96	118	01	18 84	19	39N	38E
	Antelope Mine	48	52	04.80	118	01	05 88	19-20	39N	38E
	Hubbard Mine	48	55	15.96	117	52	03.72	32	40N	39E
	New Leadville Mine	48	44	08.52	117	52	33.60	3	39N	39E
	R.J. Mine	48	43	54.84	117	52	31.80	3	37N	39E
*	Van Stone Mine/Mill	48	45	38.16	117	45	23.76	33	38N	40E
	Hope & Twin Cabins Mine	48	53	09.96	118	01	37.92	7	39N	38E
	St Crispen Mine	48	56	30.99	117	47	7.47	25	40 N	40 E
	Northport Mill	48	56	31.08	117	45	15.66	30	40 N	40 E
*	LeRoi/Northport Smelter	48	55	23.16	117	46	02.28	33	40N	40E
*	Black Rock Mine/Mill	48	53	16.44	117	54	25.56	24	39N	40E
*	Great Western Mine	48	52	06.24	117	41	48.48	24	39N	40E
*	Last Chance Mine/Mill	48	51	59.40	117	41	56.40	24	39N	40E
*	Deep Creek Mine	48	51	48.96	117	42	54.36	26	39N	40E
*	Copper King Mine	48	46	51.60	117	39	12.24	32	33N	41E
*	**Bonanza Mill**									

key:

* **sampling conducted by EPA**

ABSTRACT

Fumed tail slag was collected from Cominco's lead/zinc smelter located at Trail, B.C. and tested for toxicity using five species of aquatic organisms representative of different levels of the food chain: *Selenastrum capricornutum*, a unicellular green alga; *Daphnia magna*, a zooplanktonic species; *Hyalella azteca*, an epibenthic invertebrate; *Chironomus tentans*, a benthic invertebrate; and rainbow trout (*Oncorhynchus mykiss*) fingerlings. Slag was found to be detrimental to all species studied. Results of ICP scans on bioassay water collected at the completion of each bioassay indicated that elevated levels of copper and zinc may have been at least partly responsible for the acute toxicity observed. Results of histological analyses performed on rainbow trout exposed to slag indicated that slag also caused mortality by abrading delicate exposed surfaces such as gills.

July 1992

SURVIVAL AND WATER QUALITY RESULTS OF BIOASSAYS ON FIVE SPECIES OF AQUATIC ORGANISMS EXPOSED TO SLAG FROM COMINCO'S TRAIL OPERATIONS

by

Jennifer C. Nener

Eastern B.C. Unit

Habitat Management Division

Department of Fisheries and Oceans

Fisheries Branch

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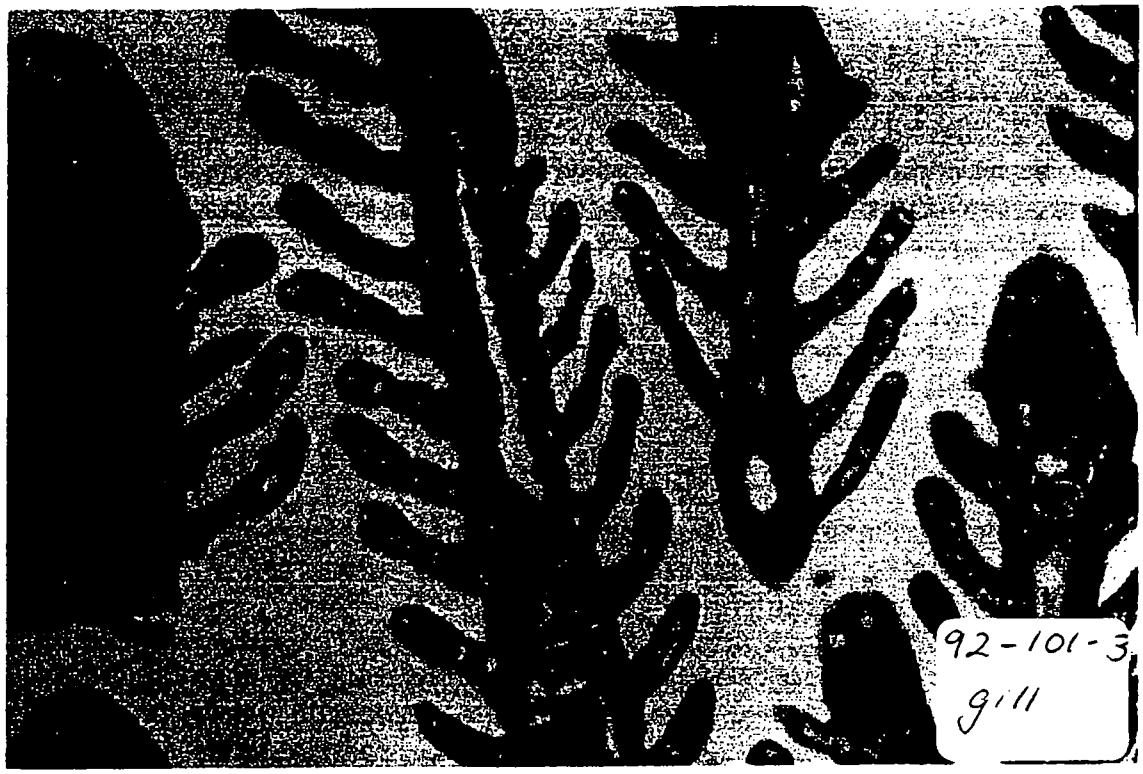
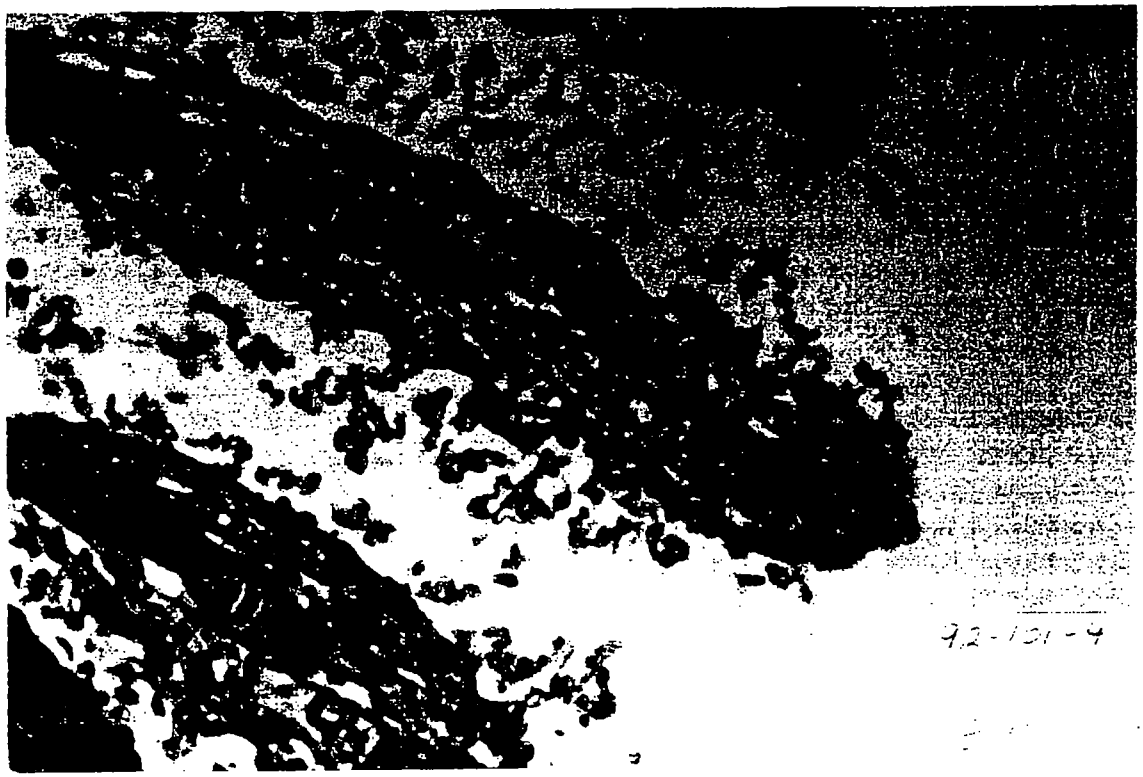
Figure 1 Cross Sections of Rainbow Trout Gills Showing Damage Caused by Abrasion



1. a) Gill from Control fish.



1. b) Gill from fish exposed to slag (Tap 1/2) for 7 hours
Note the eroded lamellae of gills exposed to slag.

COMINCO SLAG IN LAKE ROOSEVELT

Review of Current Data

Prepared by:

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Office of Toxic Substances
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Washington State Department of Health

DECEMBER 1993

Washington State Department of Health

Conclusions

Findings from the above recent studies contradict previous conclusions, i.e. that Cominco slag leaches little and is biologically inert. These recent laboratory studies confirm that Cominco slag is toxic to all aquatic test species due to the leaching of significant amounts of copper and zinc and/or physical abrasion of vital tissues such as gills. Nener (1992) observed that increasing concentrations of dissolved metals in bioassay supernatant was associated with increases in bioassay duration (10 days vs 96 and 48 hours). This suggests that slag discharged to the Columbia River and Lake Roosevelt may continue to leach metals for a period of time. The findings from these studies suggest that discharge of Cominco slag into the Columbia River and ultimately Lake Roosevelt may have detrimental effects on the lake's aquatic ecosystem due to leaching of copper and zinc and from the physical characteristics of fumed slag.

Human exposure to fumed Cominco slag on beaches of Lake Roosevelt may result from inhalation, dermal contact, ingestion of lake water, and direct ingestion of slag material. The direct ingestion of slag is believed to be the exposure route of primary human health concern. Although children, and to a lesser extent adults, may inadvertently consume small amounts of slag from time to time, metal concentrations in slag are not sufficiently high to result in acute adverse health effects. It is also unlikely that a sufficient quantity of slag (greater than four grams per month, the volume of about four pennies) would be chronically consumed by a child so as to pose a significant long-term health concern. However, this assessment is based on many assumptions and does not account for an individual's total metal exposure from all routes, including drinking water and household dust. Additionally, the reduced leachability of beach slag, as a result of weathering, was also not addressed.

In summary, slag contains various metals as do non-slag contaminated sediments and soils. Recent studies indicate that slag is toxic to a variety of aquatic organisms and may be impacting the aquatic ecosystem in the Columbia River near the Canadian boarder. Available information is not sufficient to determine the amount of a metal which would be leached from slag found on Lake Roosevelt beaches, as it passes through the human digestive tract. If one assumes that the full concentration of each metal identified in fumed Cominco slag is available for gastro-intestinal absorption following human ingestion, then the metal of greatest concern is copper. Based on this scenario, a child could consume as much as four grams of slag per month or about the same volume as four pennies without experiencing adverse health impacts.

EPA Upper Columbia River Site Investigation
2001 Sampling Event
River sediment sample results
Range of detections, ppm

Substance	Inchelium to Kettle Falls	Kettle Falls to Northport	Northport to US-CAN border	Consensus-Based Threshold Effects Concentrations (TECs)	WA State Freshwater Sediment Quality Values (FSQVs)	Background Concentration, Lower Arrow Lake Ecology 2001
Arsenic	non detect - 2.8	3.4 - 26.9	7.6 - 42.8	9.8	57	2.0 U (non detect)
Cadmium	0.12 - 11.1	non detect - 7.2	non detect - 4.8	0.99	5.1	0.44
Copper	10.4 - 111	18.1 - 1,550	245 - 3,300	32	390	3.6
Lead	6.2 - 841	6.7 - 1,590	199 - 512	36	450	12
Mercury	non detect - 1.7	non detect - 1.2	non detect - 0.29	0.18	0.41	0.0004 U
Zinc	36.8 - 1,460	42.3 - 24,900	2,430 - 22,300	121	410	26.9

FSQVs and TECs represent the spectrum of both moderately conservative and highly conservative guidelines to evaluate the relationship between metals concentrations and the possibility of effects to benthic life (Johnson et al. 2000; Serdar et al. 2000)

TEC = Concentration below which harmful effects on sediment dwelling organisms are not expected to occur.